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EARLY HISTORY OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

By J. H. Emerton.

Before the year 1874 the entomologists around Boston had been accustomed to meet as a section of the Boston Society of Natural History,[1] but some of them had ambitious plans in their minds: they wanted to publish a journal, to meet outside of Boston and to have members from all over the country, so a new society was planned and as a large proportion of the members lived in Cambridge, the society was formed there.

January 9, 1874, at the house of H. A. Hagen, Putnam Street, Cambridge, the following persons met and agreed to form the Cambridge Entomological Club:

E. P. Austin	J. H. Emerton	H. K. Morrison
Edw. Burgess	H. A. Hagen	J. C. Munro
G. R. Crotch	S. Henshaw	A. S. Packard
Geo. Dimmock	B. P. Mann	E. A. Schwarz
	S. H. Scudder	

During the year a large number of members were elected, among them

H. G. Hubbard	F. G. Sanborn	F. C. Bowditch
C. R. Osten-Sacken	G. D. Smith	L. Trouvelot
Roland Thaxter	P. S. Sprague	S. W. Williston
C. P. Whitney	Holmes Hinkley	F. Blanchard

The only officer thought necessary was a secretary, and B. P. Mann was elected to this office. Meetings were held at

[1]In January 1864 members of the Boston Society of Natural History organized the Harris Entomological Club which formed the nucleus of the Section of Entomology which was organized Nov. 25, 1866 and continued to hold meetings until 1886. Its proceedings are reported in the published proceedings of the B. S. N. H.

Mann's residence, 19 Follen St., in a little building in the yard nicknamed the "entomologicon," and the proceedings were much the same as at meetings of the Club to-day.

At the fourth meeting, April 10, 1874, it was voted to publish an entomological journal for which Scudder furnished the name, "Psyche." B. P. Mann was appointed editor, and the first part, of four pages, was issued in time for the next meeting on May 8. H. K. Morrison was appointed committee on excursions, and one was held at Waverly on May 7.

At the sixth meeting, June 12, it was voted to hold the July meeting on Mt. Washington, and the August meeting at Hartford, Conn., in connection with the American Association for the Advancement of Science.

Fig. 1. Camp of the Cambridge Entomological Club on Mount Washington, July 1874, rom a drawing by J. H. Emerton.

The seventh meeting, July 8, was held on Mt. Washington in a camp quarter of a mile below the Halfway House and far enough into the woods to be out of sight of the road. Eight persons were present at the business session:

W. B. Allen	G. M. Dimmock (father of George)
E. P. Austin	R. W. Greenleaf
F. Blanchard	B. P. Mann
Geo. Dimmock	H. K. Morrison

The party was joined later by J. H. Emerton and J. C. Munro.

The eighth meeting, August 14, 1874, at Hartford, Conn. was attended by Messrs. Austin, Dimmock and Mann, and they were joined by C. J. S. Bethune, S. S. Haldeman, J. L. Leconte, J. G. Morris, J. A. Lintner, C. V. Riley, Wm. Saunders, and other wellknown entomologists of the time. At the meeting of September 11, The Entomological Club of the American Association for the Advancement of Science was organized to continue such meetings.

In the following year, July, 1875, another field meeting was held on Mt. Washington, this time with 24 persons—6 of them members of the Club, 18 guests: 10 of them men, 14, women. The August meeting was again with the American Association at Detroit, Mich.

In 1877, the Club was incorporated, a constitution and by-laws were adopted, and the membership revised, after which there were 24 resident members and 23 non-resident; a by-law defined a resident member as one who lived where he could attend meetings and get home the same night. The average attendance at meetings was for the first year 11.1; second year, 11.8; third year, 7.4 The first volume of "Psyche" was finished in 1877 with a deficit of $128.39; the running expenses of the Club in 1877 having been only $3.00.

The first meeting of the executive committee was on March 17, 1877, when it was proposed to start the collection of a publication fund of $2000. A circular was sent out in which was the following statement of the Club's objects:

"While the headquarters of the Club are in Cambridge and its welfare would redound particularly to the credit of that city, its membership extends over the whole of North America and its advantages are offered with entire liberality to all the entomologists of the country, as far as practicable. There is but one other incorporated entomological society in the United States—The American Entomological Society in Philadelphia—and none other that is actually engaged at the present time in work of general interest."

June 13, 1879, a contract was made with Geo. Dimmock to publish Vol. 3 of "Psyche," beginning in 1880. By February, 1881, the resident membership had fallen to 16, while the non-reisdent had increased to 59. In December, 1882, the secretary, Mr. Dimmock, offers in "Psyche" to present at meetings papers by non-resident members and to send them on request reports of meetings. Books from the Club's library were sent to distant members on payment of postage, but little use was made of these facilities. In 1882 the average attendance at meetings fell to 5.2 and in 1884 to 4.

The loss on Vol. 3 of "Psyche" was $252.60, which was paid by Mr. Dimmock, and a vote of thanks passed by the Club.

In 1887 Mann moved away from Cambridge and the Club's library was taken to the Boston Society of Natural History. "Psyche" was not published between 1886 and 1888 for want of an editor, but it was taken up again by Scudder, who had built his new study in his garden and invited the Club in 1888 to meet and keep its library there.

The main interests of the Club at this time were the publication of "Psyche" and the membership of entomologists all over the country, and the meetings of local members were small. Presidents were elected from prominent entomologists in distant places, their principal duty being to furnish an address at the end of their term. W. H. Ashmead of Washington was president in 1893 and T. M. Bean of Laggan in the Rocky Mountains in 1894.

By 1895 Scudder's health began to fail and meetings were held at Henshaw's house in Cambridge or Hayward's in Boston, usually with small attendance. The annual meeting of 1903 was adjourned from month to month for want of a quorum, and the election took place only in April.

The original members of the Club had now nearly all given up an active part in its work. Austin, Dimmock, Mann, Morrison and Schwarz had moved away from Cambridge, Scudder was sick, and Hagen had died.

At this time a new set of men came into the Club. While the Cambridge Club had been spending its strength in spreading its influence all over the continent, the local entomologists had

formed another organization, the Harris Club.[2] In 1895, W. L. W. Field became a member of the Cambridge Club and soon after was elected secretary; he was also a member of the Harris Club and arranged the union of these two organizations and at the meeting of December 26, 1902, the entire Harris Club was nominated for membrship.

March 13, 1903, at a meeting with three members present, Bowditch, Field and Hayward, 39 members of the Harris Club were elected. Many of these soon disappeared, but among them were a dozen active members for many years, some to the present day,—among them:

P. G. Bolster	W. F. Low	A. C. Sampson
H. K. Burrison	John Lowell	F. Sheriff
W. D. Denton	H. H. Newcomb	L. W. Swett
H. H. Kirkland	J. H. Rogers	A. G. Weeks

December 26, 1902, S. Henshaw was elected editor of "Psyche."

Meetings were held at the house of the Boston Society of Natural History and the annual meeting of 1903 (adjourned since January) was held on April 10, with 18 members present. During this year C. W. Johnson and C. V. Blackburn were elected members. A committee, Messrs. Bolster, Field, Henshaw and Johnson, was appointed to take charge of "Psyche." Scudder's sickness had gone so far that it was necessary to remove the Club's library from his house, and having no other place to keep the books, the Club voted to give to the Boston Society of Natural History any books it might need and to sell the rest. Some of these were sold by auction at Club meetings by H. H. Newcomb and the proceeds used toward the expenses of "Psyche." Meetings were held at the Boston Society of Natural History, at J. H. Emerton's room at 194 Clarendon St., and at the Appalachian Club's rooms in the Tremont

[2]The Harris Club (which has no relation to the Harris Entomological Club of 1866) was organized November 24, 1899 at 35 Court St., Boston in the office of H. H. Newcomb. W. L. W. Field was elected secretary and continued in office until the union with the Cambridge Entomological Club in 1903. The records of the Club are deposited in the library of the Boston Society of Natural History.

Building, and in emergencies at H. H. Newcomb's office, 35 Court Street, with attendance of 12 to 13. December 6, 1904 a meeting was held at Wm. Denton's in Wellesley to see his butterflies, with attendance of 12 members and 5 guests.

In 1904 to 1908 exhibitions of insects, open to the public, were held at the rooms of the Appalachian Club. The exhibition of November, 1908, included the following:

H. H. Newcomb, *Papilia turnus* and *glaucus* with intermediate forms.

A. P. Morse, Grasshoppers, showing methods of egg-laying.

W. L. W. Field, North American Sphingidæ.

F. B. Low, Gipsy moth, Browntail, etc.

W. M. Wheeler, 85 species of Ants of New England.

J. H. Emerton, Collection of 200 New England Spiders.

Emerton & Swett, Collection of Lepidoptera.

January 19, 1909, the amended by-laws, which had been in preparation for a long time, were adopted.

March, 1909, the last of the books from the Club's library were sold, and the old record books deposited with the Boston Society of Natural History.

December, 1909, the Club entertained the entomologists attending the meeting of the American Association for the Advancement of Science at a smoker at the Grundmann Studios, Clarendon Street.

At the annual meeting, January, 1910, the retiring president, P. G. Bolster, read a paper on the history of the Club.

C. T. Brues was elected a member of the Club October 19, 1909, and editor of "Psyche" at the annual meeting, January, 1910. At the same meeting W. M. Wheeler was elected president, and at the meeting of February, 1910, the Club voted to hold its meetings at the Bussey Institution. This brings us to another period in the Club's life familiar enough to the present members, and so my story ends.

THE BIOLOGY OF *TRICHOPODA PENNIPES* FAB. (DIPTERA, TACHINIDÆ),

A PARASITE OF THE COMMON SQUASH BUG.*

By Harlan N. Worthley.

Massachusetts Agricultural Experiment Station, Amherst, Mass.

PART I.

INTRODUCTION.

The common squash bug, *Anasa tristis* de Geer, is an ever-present and often troublesome pest in Massachusetts, and has been a subject for investigation at the Massachusetts Agricultural Experiment Station for the past three years. While studying the life history and habits of this pest, the writer discovered abundant evidence of the presence and activity of the parasite *Trichopoda pennipes*. A review of the literature showed that comparatively little is known of the life history and habits of this beneficial fly. Much to the surprise of the writer, in view of his own observations, it was found that some authors have even intimated that little good is derived by mankind from the work of this supposedly beneficial species.

Failure of the written records to substantiate observations of the writer furnished the initial stimulus to a study of the habits of the fly, the object of this study being to discover the exact relationship existing between parasite and host. A portion of the following account is the result of these studies.

During the course of the work it was found necessary to confine adults of both sexes in the same cage to induce mating. Some difficulty was experienced at first in determining the sex

*Thesis submitted for the degree of Master of Science at the Massachusetts Agricultural College, and published with the consent of the Director of the Graduate School. The writer takes this opportunity to express his thanks to Dr. H. T. Fernald, whose kindly interest has made the present study possible, and who has criticized, to their benefit, the drawings accompanying the paper; to Dr. G. C. Crampton, under whose supervision the morphological study has been carried on, for aid in matters of technic and the interpretation of parts; and to Dr. C. P. Alexander for assistance with the literature of dipterology.

of living flies, without undue handling, and this led to a study of the external anatomy of the species, the primary aim being the discovery of secondary sexual characters that might be readily recognized.

The scope of this investigation has gradually increased, and in this paper takes the form of an exposition of the external morphological characters of the species. These characters are here designated according to the most widely accepted view of leading workers in insect morphology, and thereby do violence to the terminology in common use among taxonomic workers. This is perhaps unfortunate, but it is unavoidable, if morphological accuracy is to be maintained.

SYNONYMY.

The species was first described by Fabricius (1794)[1] as *Musca pennipes*, from material secured from the "Carolinas." His subsequently described *Thereva hirtipes* (1805, p. 219.9), *Thereva pennipes* (1805, p. 219.8), and *Ocyptera ciliata* (1805, p. 315.9) have proved to be synonyms. His *Dictya pennipes* (1805, p. 327.5) is a change of genus from *Musca*. Other synonyms are *Phasia jugatoria* Say (1829), and *Trichopoda flavicornis* and *T. haitensis* of Robineau-Desvoidy (1830). The genus Trichopoda was erected by Latreille (1829), and both Wiedemann (1830) and Robineau-Desvoidy (1830) soon placed the *Musca pennipes* of Fabricius in this genus. The *T. pyrrhogaster* and *T. ciliata* of Wiedemann (1830) have since fallen as synonyms, Brauer and Bergenstamm (1891) showing that these were but females of the species. The complete synonymy, so far as can be determined by the writer, is included in the bibliography at the end of this paper.

GEOGRAPHICAL DISTRIBUTION

The genus *Trichopoda* belongs to the New World fauna. *T. pennipes* has a wide distribution in both North and South America and among the adjacent islands, according to Townsend

[1]Dates in parenthesis refer to the bibliography.

(1893), who records it from Argentina, Brazil, Mexico, San Domingo and Jamaica, and in the United States from New England to Florida, along the coast of the Gulf of Mexico to Texas, and in California. He speaks of it also from Michigan, Illinois, Indiana, and Iowa. It is essentially a lowland form, being most abundant within its range at elevations of five hundred feet or less. Aldrich (1915) states that the species "appears to occur from Argentina north to about the latitute of Kansas, and further north to the eastward, but not in the northwest." Records of its capture in St. Vincent, Porto Rico, and other islands of the West Indies are given in Aldrich's Catalogue (1905). Wilson (1923) adds St. Croix, of the Virgin Islands group, to this list.

HOSTS.

The first record of the life history of *Trichopoda pennipes* appears to be a note by Packard (1875) of a Tachina fly parasitic upon the squash bug (*Anasa tristis* de Geer, Hemiptera, Coreidæ.) While the species is not mentioned, the description points quite conslusively to *T. pennipes*. A. J. Cook (1889) records the insect by name and gives an account of its habit of parasitizing the squash bug. Later authors recording it as a parasite of the squash bug were Coquillett (1897), Chittenden (1899), and Weed and Conradi (1902). For a number of years no other host was known, but Morrill (1910) recorded a rearing of *T. pennipes* from the Northern Leaf-footed Plant Bug (*Leptoglossus oppositus*, Hemiptera, Coreidæ). Jones (1918) records it as an enemy of the Southern Green Plant Bug or Pumpkin Bug (*Nezara viridula*, Hemiptera, Pentatomidæ), and Watson (1918) also records this host in Florida, Drake (1920) also reared this parasitic fly in Florida from the Green Soldier Bug (*Acrosternum hilaris*, Hemiptera, Pentomidæ), the Green Stink-bug (*Acrosternum pennsylvanicum*) and a large Coreid, *Archimerus calcarator*. He also noted eggs on *Acanthocephala femorata* and *A. declivis*. Wilson (1923), in collecting *Nezara viridula* on the Island of St. Croix, found 93 per cent of the specimens parasitized by *T. pennipes*.

Mr. H. J. Reinhard, entomologist of the Texas Agricultural Experiment Station and a specialist in Tachinidæ, says in correspondence with the writer that in Texas *T. pennipes* is parasitic upon *Nezara viridula* and *Leptoglossus phyllopus*. He adds, "I have observed adults depositing eggs on the adult Harlequin Bug (*Murgantia histrionica*, Hemiptera, Pentatomidæ) but have never been able to obtain any emergence of the parasite."

In Massachusetts this beneficial insect is important as an enemy of the squash bug, and in the following pages it is treated in its relation to this host.

Methods employed.

The following account of the life history and habits of *Trichopoda pennipes* has been taken from field and laboratory records compiled by the writer during an investigation of the squash bug. Collections of the bugs in the field furnished parasitized material for breeding purposes and also indicated the percentage of infestation. In the laboratory the parasitized bugs were kept in breeding cages containing small potted squash plants. The cages used were devised at this Station, and are so built as to afford a maximum of light. A vertically-sliding pane of glass comprises the door, and this, together with a hinged glass top, allows all corners of the cage to be readily observed from the outside. The sides and back of the cage may be covered with fine-mesh cloth screening, or with copper wire cloth. During this investigation, the cages rested on pieces of slate covered with an inch of soil, to provide normal conditions for pupation of the parasite.

LIFE HISTORY.

The Egg. The female fly lays its eggs upon the body wall of the host, to which the eggs are firmly attached. The great majority of the eggs are found on the sides of the abdomen and thorax, although they are sometimes seen fastened to the upper surface of the body and the head, and rarely to the antennæ and legs.

The length of time necessary for the hatching of the egg was found to be in the neighborhood of thirty hours. To prove

this point eggs were removed from the body of a bug as soon as laid, a moistened camel's hair brush proving to be excellent for this purpose, and were isolated in vials. After twenty-four hours the mouth-hooks of each young maggot could be seen rasping away at the inner surface of the egg-shell, and in thirty hours the larva was found protruding from the hole it had scraped in the floor of its prison. Eggs removed from the body surfaces of bugs thirty hours after oviposition were found to be empty, a hole in the bottom of each, and a corresponding hole in the chitin of the host, testifying to the penetration of the parasite.

The Larva. As stated above, the larva, upon hatching, penetrates the bottom of the egg-shell and burrows directly through the body-wall of the host, regardless of the thickness of chitin at that particular point.

Sufficient dissections of parasitized squash bugs have not been made to enable the writer to state accurately the habits of the parasite within its host, or the number of larval instars. Individuals of three different instars have been observed, and it is probable that there are four in all, as has been stated by Townsend (1908, p. 98) for certain other Tachinid parasites. Dissections seem to show that the larvæ while young live in the general body-cavity, no derangement of organs being apparent in these dissections. As the larvæ approach maturity, however, they gradually consume the fat body and those organs contained in the abdomen of the host, which was seen to be practically hollow in some adult squash bugs from which parasites had just emerged.

Upon the completion of growth, which requires approximately sixteen days, the larva forces its way out at the posterior end of the body of the host, which is still alive, and drops to the ground. This is not the case with the second generation larvæ, which appear to remain within the body of the host throughout the winter, completing their growth when the latter become active in the spring. The host dies within a day or two of the emergence of the parasite. Emergence through the side of the body, as recorded by Weed and Conradi (1902), has not been observed.

The Puparium. Within a few hours of the time the mature larva quits the host, it burrows into the soil to a depth of one to two inches, and there pupates within the last larval skin, which forms the puparium. The pupa, then, falls in the first class as defined by Thompson (1910, p. 284), and probably has a rapid early development. Dissections of the puparia have not been made, and thus the appearance of the pupa and its rate of development are unknown. The pupal period of the spring generation is approximately a month in length, while that of the summer generation lasts from thirteen to nineteen days.

The Adult. The flies are able to take wing within a few seconds following emergence, and have been observed to mate within twenty-four hours. The length of time which then ensues before oviposition commences is not known, nor has the average number of eggs laid per female been determined. One fly laid thirty-nine eggs in twenty-four hours, and another, when captured in the field, contained over one hundred eggs.

In the cages, honey-water on sponges failed to attract the flies. They were captured in the field from the flowers of Wild Carrot (*Daucus carota*) and Meadow Sweet (*Spirwa salicifolia*) and would feed from these flowers in the cages. The writer did not learn of Townsend's (1908, p. 110) method of feeding, using dry sugar and sponges moistened with water, until too late to use it in the breeding work.

The behavior of caged females toward the bugs confined with them was interesting to observe. The urge to lay eggs did not appear to be constant. At times the flies would walk about among the bugs, with apparent friendliness, and would even crawl over them without making a menacing movement. At other times a fly would dart at a bug and alight upon its back, and the writer would focus his attention in the expectation that an egg would be laid. The fly would turn this way and that upon the unresponsive host, as if trying to decide where to place the egg, but after a few seconds would walk off, as if having changed its mind, leaving no egg behind. When oviposition actually took place, the act was accomplished with great rapidity, the fly seeming scarcely to come to rest upon its host. That no such speed was necessary could be seen in the lack of

interest displayed by the victim, which neither resisted the attack of the fly nor tried to dislodge the egg.

Relation Between Parasite and Host.

Various observers have noted the parasitic habit of *Trichopoda pennipes* and have speculated upon the amount of benefit derived from its activities. Thus Dr. A. S. Packard (1875) says, "The larvæ are very large, one specimen only occurring in the body of the *Coreus*, which seems apparently healthy, and performs its sexual functions in spite of the presence of so large a parasite." Chittenden (1899) observes that "Although these flies appeared soon after the advent of the bugs and in considerable abundance, they seemed to accomplish little in the direction of reducing the numbers of their host.—The parasitized individuals were not noticed to die much earlier than those which succumbed to natural causes." Weed and Conradi (1902)

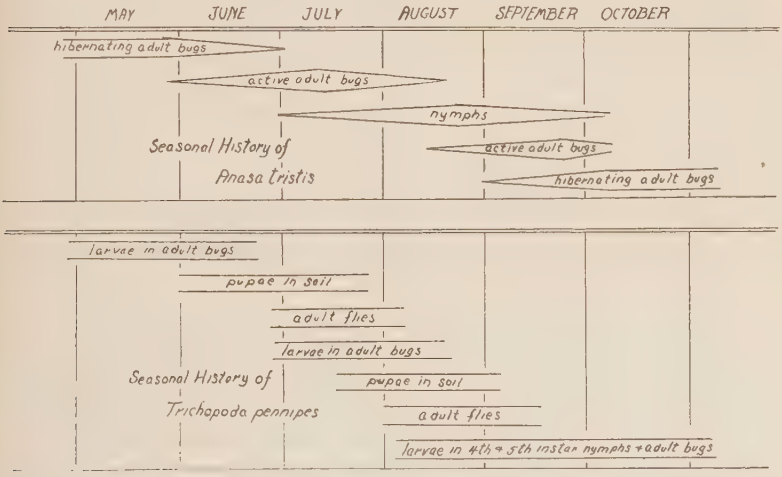

Fig. 1. Relation of *Trichopoda pennipes* to its host, *Anasa tristis*, Amherst, Massachusetts, 1922. Worthley (1923).

also mention the continued egg-laying of parasitized squash bugs. Drake (1920) in his notes on *T. pennipes* as a parasite of the Southern Green Stink-bug mentions percentages of parasitism ranging from 31 to 80 per cent.

About Amherst, Massachusetts, *Trichopoda pennipes* appears to have two full generations each year (Worthley, 1923). A single adult captured in October may indicate a partial third generation, but it is thought more probable that this was a laggard individual of the second generation.

The emergence and pupation of second generation larvæ in the fall was not observed in the cages, and it therefore appears that the parasite passes the winter as a larva within the body of the hibernating host. Development of these larvæ is completed in the spring, emergence from the host and pupation occurring during June and July. This emergence is shortly followed by the death of the host, which, in all cases so far observed, has not been able to commence egg-laying.

Pupæ developing from these overwintered larvæ begin to yield flies in late June. At this time only adult squash bugs are available, and upon these the flies deposit their eggs. These bugs are individuals which escaped parasitism the previous fall, and have lived to mate and lay eggs. Many of them are actively engaged in oviposition when attacked by the parasite, and these can often complete their egg-laying before the activities of the maggots become fatal. One female squash bug laid a cluster of viable eggs just six days previous to her death from parasitism, showing that the metabolism of the host is not seriously unbalanced until late in the development of the parasite. It is this apparent slight effect of parasitism on the egg-laying bugs which has caused investigators to question the efficiency of the parastism of *T. pennipes*.

While parasitized egg-laying squash bugs may be permitted to complete a practically normal existence, as has been shown above, the parasite itself may not be so well favored. Thus adult bugs begin to disappear from the fields about the middle of July, having completed the normal span of life. Parasite flies are actively laying eggs at this time, and often deposit them upon bugs which are destined to die before the parasitic larvæ have attained full growth. In such cases the parasite cannot complete its development, and perishes with its host.

Larvæ which have been more fortunately situated mature and pass on to the pupa stage during the latter part of July and

early August. When these pupæ yield adult flies during August and the first part of September, many young squash bugs have become adult, and more have reached the fourth and fifth instars. Upon these bugs the parasite lays its eggs, and it is in this generation that the work of the fly is seen to be effective beyond question, since no parasitized bug appears to live to sexual maturity. Many nymphs (counts have shown about 50 per cent) die before becoming adult, and those which reach the adult state and pass the winter safely in hibernation, are subsequently killed by the parasite before laying eggs.

No parasites appear to reach maturity in nymphs which die. In this regard the egg-laying flies seem unable to discriminate closely between nymphs which are sufficiently developed to support the parasite maggots and those which contain too little substance. However, the flies seem to realize that their progeny will find too little nourishment in nymphs younger than the fourth instar, since third instar nymphs were rarely molested in the cages, and parasitized third instar nymphs were not collected in the field.

It was interesting to note that occasionally a nymph would escape parasitism by molting, leaving an unhatched parasite egg on the molted skin. This does not account for any great loss, however, since the egg of the parasite hatches in thirty hours, while the fourth and fifth instars of the squash bug require about six days and sixteen days respectively for their completion.

But one parasite has ever been observed to issue from one host. Several maggots have been observed to enter one host, but this has always seemed to result in the early death of the host and of the parasites within.

Collections of squash bugs in the fall give no indication of the true percentage of parasitism, since many nymphs die, and others slough off the empty egg-shells of the parasite with their molted nymphal skins. In midsummer, however, collections of overwintered adult bugs have indicated a parasitism as high as 80 per cent. There is no reason to suppose that the percentage of parasitism may not often run as high among the older nymphs

and new adult squash bugs in the fall. Thus it would seem that the activities of *Trichopoda pennipes* furnish an exceedingly important natural check upon the increase of *Anasa tristis*.

Summary

Trichopoda pennipes is a parasitic fly belonging to the family Tachinidæ. The species enjoys a wide distribution in the lowlands of North and South America and the adjacent islands, and has been recorded as attacking several species of insects belonging to the hemipterous families Coreidæ and Pentatomidæ. Among these hosts is the common squash bug, which in Massachusetts is the principal host, and possibly the only one attacked by the fly.

The investigations recorded in this paper indicate that in Massachusetts this parasite passes through two full generations annually. Adults of the first generation deposit their eggs on egg-laying adult squash bugs, during July. Those of the second generation attack the older nymphs and new adult bugs in August and September. Collections of squash bugs have indicated a parasitism of eighty per cent. Squash bugs which are parasitized in the fall apparently do not live to sexual maturity, and thus an important natural check is placed upon the increase of the squash bug.

NOTES ON *MUSCINA PASCUORUM* MEIGEN DURING 1923.

By Charles W. Johnson.

Boston Society of Natural History.

The sudden occurrence, and in great numbers, of *Mucina pascuorum* in North America in 1922, was recorded by the writer in Psyche, Vol. 30, p. 1-5, Feb., 1923.

Early in 1923 very few specimens were seen. Mr. A. P. Morse took a specimen Jan. 18 at Wellesley, Mass. The most interesting recorded is that from Bridgeton, N. J., where Mr. F. M. Schott captured a specimen under bark, Feb. 11. This, so far, is the most southern record for the species. Specimens were also taken under bark, at Annandale, N. J. March 7, by parties scouting for Gypsy Moth eggs. The locality is about 20 miles west of Bound Brook, where it was previously recorded. A specimen was taken in a window at Brookline, Mass., March 3. Having stated to Mr. F. W. Walker that it would be interesting to see how the fly had stood the winter, Mr. Walker visited the locality where they were so abundant, and in a letter says:—"I am sending a box of flies taken April 10, 1923, at Asbury Grove, Hamilton, Mass., on the same skylight that I collected from Nov. 9, 1922. A few scattering ones were taken on other windows." The box contained 125 *M. pascuorum*, 93 *Pollenia rudis*, 7 *Phormia regina* and 6 *Muscina assimilis*.

None were observed during the late spring and summer, but early in September, Mr. L. W. Swett, brought me a number of flies that had accumulated in the globe of an arc light at the Glen House, at the foot of Mt. Washington, N. H. Among these was one *M. pascuorum* the most northern record for New England. A few specimens were received from Attleboro, Mass., Oct. 14 and Worcester, Nov. 2. Two were collected on windows at Brookline, Oct. 28 and Nov. 4 and one on a window in Boston Dec. 3. Mr. Walker informs me that appararently the fly was not seen at Asbury Grove this fall.

The scarcity of this fly during 1923 in comparison with its abundance in 1922 is undoubtedly due to the very dry weather during the late summer and fall. Owing to the drouth there was comparatively little fungi. As this species is said, by European authors, to frequent *Amanita citrina*, the paucity of fungi during the late summer and early autumn would, also, probably account for the scarcity of the fly. It seems an interesting problem;— if the hibernating females lay eggs in the spring and the larvæ live on fungi, on what does the female lay her eggs, when there are practically no fungi in the early spring?

I hope, during the coming season if possible, to make some experiments relative to the breeding habits of this fly and information regarding its further distribution will be greatly appreciated.

NOTES ON CUBAN ANTS.

Wm. M. Mann.

Bureau of Entomology, U. S. Department of Agriculture.

In a small collection of ants from Cuba sent by Mr. S. C. Bruner, of the experimental station at Santiago de las Vegas, and collected by him and Mr. C. H. Ballou, are two undescribed species of the genus *Macromischa*. This increases the number of known Cuban species to sixteen, and I think it probable that future collectors will find still more of these interesting ants, the species of which appear to be very local in distribution and difficult to find.

In addition to the descriptions of these I have listed for distributional data several other species of interest.

Macromischa (Macromischa) bruneri, new species.

Worker. Length 2.75 mm.

Head a little longer than broad, as broad in front as behind, with slightly convex sides, broadly rounded corners and nearly straight occipital border. Clypeus convex, obtusely carinate at middle, straight at anterior border. Antennal scapes nearly attaining occipital corners; funicular joints 3-8 transverse, club rather strong. Thorax rather robust, without sutures above; sides of prothorax evenly rounded. Epinotal spines nearly approximate at base, not very acuminate, about as long as the epinotal declivity. Petiolar peduncle slender, about as long as the node, which is longer than high, rounded above, and seen from above twice as long as broad. Postpetiole twice as broad as petiole, as long as broad and only slightly broader behind than in front. Femora slender basally, swollen at middle and narrowed apically, with the flexor border rather strongly concave. Tibiæ strongly incrassate.

Moderately shining. Mandibles sparsely striate and with several coarse punctures. Head, thorax and epinotum densely punctate and subreticulately striate, the latter strongest on

pronotum; petiolar pedicel subtly punctate, nodes of petiole and postpetiole smooth above, obliquely striate at sides. Gaster and appendages finely punctate:

Pilosity pale yellow, fine and erect, rather sparse on head, body and appendages.

Brownish red, the gaster darker and the legs lighter than the rest.

Sierra Maestra, July, 1902, Alt. 4500-5000 ft.

Type. Cat. No. 26497 U. S. N. M.

Described from four workers.

M. bruneri is most closely related to *M. affinis* Mann, and like it, superficially resembles a Tetramorium. It differs from *affinis* in its smaller size, the much shorter epinotal spines (in *affinis* these are fully as long as the petiolar pedicel), in the petiolar node rising less abruptly from the pedicel and in sculpture and coloration.

Macromischa (Macromischa) violacea, new species.

Worker. Length 4.5 mm.

Head, excluding mandibles, one-sixth longer than broad, sides very slightly convex, posterior corners broadly rounded, border nearly straight. Mandibles with five rather strong teeth. Clypeus nearly flat, its anterior border straight at middle. Eyes large and convex, situated at middle of sides of head. Antennal scapes not quite attaining occipital corners; funicular joints 2-8 scarcely broader than long; club shorter than remainder of funiculus. Thorax and epinotum very robust, as broad in front as behind and only feebly and narrowly constricted at sides between pro- and mesothorax; no sutures discernible. Epinotal spines moderately thick, slightly curved, shorter than their distance apart at base. Peduncle of petiole nearly twice as long as the node, which rises from it abruptly and, in profile, is higher than long, with nearly straight anterior and posterior surfaces and slightly convex dorsum, and from above transversely suboval. Postpetiole campanulate and broader than long. Femora and tibiæ rather strongly incrassate.

Shining throughout. Mandibles coarsely striate. Head and thorax with fine, widely separated longitudinal wavy carinulæ, discernible above only in certain lights, stronger on pleuræ; head, body and appendages rather finely punctate and with erect, whitish hairs that are longer and stiffer on the legs.

Color black, head and thorax with strong violaceous reflections.

Sierra Maestra, July, 1922. Alt. 600-900 m.

Cotypes. Cat. No. 26498 U. S. N. M.

Described from two workers.

This is a very distinct species, resembling *M. scabripes* Mann somewhat in form and in having the femora minutely tuberculate, but differing strongly in sculpture and color and in its larger size and stouter thorax.

The violaceous reflection of the tegument is unusually strong, even for a *Macromischa*.

Macromischa (Macromischa) affinis Mann

Sierra Maestra, July, 1923. Alt. 3000-3500 ft.

A single worker in the collection is considerably darker than those in the type series, with the head and thorax dark, reddish brown and only the bases of the femora pale, otherwise agreeing exactly.

Macromischa (Croesomyrmex) wheeleri Mann

Vinales, April

Three workers.

Macromischa (Croesomyrmex) poeyi Wheeler

Worker. Length 5.5 mm. (Fig. 1.)

Head longer than broad, strongly narrowed from behind eyes to occipital border which has an elevated margin. Clypeus convex, carinate at middle, shallowly concave at middle of anterior border. Antennæ very slender, their scapes surpassing occipital corners by one-third of their length; first funicular

joint shorter than the second and third together, second joint about two and one-half times as long as broad, remaining joints gradually increasing in length toward apex, club long and slender. Prothorax with a transverse, subquadrate "neck"; sides of mesothorax angulately expanded behind the middle. Epinotum unarmed, its base three times as long as broad and nearly four times as long as the declivity; in profile shallowly concave. Petiole very long and slender, its node low and rounded above

Fig. 1. *Macromischa Cræsomyrmex poeyi* Wheeler. Worker.

and a little more than half as long as pedicel; from above, the node is scarcely thicker than the pedicel, about four times as long as broad and with straight sides. Postpetiole elongate, campanulate. Legs long and very slender, except the apical three-eighths of femora which are very strongly swollen.

Thorax and epinotum shining, with moderately strong and irregular rugæ which are transverse on dorsum, subconcentric on mesonotal and longitudinal on epinotal pleuræ; head, petiole, gaster and appendages more shining, and finely punctate.

Stiff, blunt, erect, brownish hairs, abundant on head and body; finer and pointed on legs; erect hairs lacking on antennæ which bear fine and shorter semirecumbent hairs.

Thorax, epinotum and basal portion of femora reddish brown, the remainder black.

Vinales, April.

Described from one worker. The species was described from a specimen in the Gundlach collection in Havana under a sealed glass and Wheeler's description differs only in the shape of the postpetiole, described as broad as long, and in the sculpture of the thorax, described as finely and densely punctate, points which probably could not be made out with a hand lens at some distance from the specimen.

In addition to the unusual structure of the femora, the elongate head, narrowed behind, resembling that of some of the Aphænogasters, is distinctive.

Myrmelachista rogeri Ern. André.

Sierra Maestra, Alt. 3000-3500 ft. July.

Prenolepis gibberosa Roger.

Sierra Maestra, July. Alt. 2900-3500 ft.

This is evidently widely distributed in the higher, wooded portions of Cuba.

Camponotus (Myrmeurynota) gilviventris Roger.

Nagua, Oriente, July.

Colobopsis (Manniella) sphaericus Roger var. **sphaeralis** Roger.

Sierra Maestra, Alt. 3000-3500 ft. July.

NOTES UPON SURCOUF'S TREATMENT OF THE TABANIDÆ IN THE GENERA INSECTORUM AND UPON ENDERLEIN'S PROPOSED NEW CLASSIFICATION OF THIS FAMILY.[1]

By J. Bequaert.

The Tabanidæ are a family of Diptera of considerable economic importance. They are universal in their distribution and extremely numerous in species, over 2,100 forms having been described thus far. The great majority of these bite and suck the blood of vertebrates and thus become at times very troublesome to man and his domestic animals, in addition to being actual or potential carriers of infectious diseases. Surcouf's review of the family in Wytsman's "Genera Insectorum" (Brussels, 1921, 205 pp., 5 Pls.) must therefore be greeted with satisfaction. Only those who have attempted work along similar lines can fully appreciate the amount of painstaking drudgery and first-hand knowledge involved to make such compilations of real value. Considered as a whole, Surcouf's revision is as satisfactory as it could have been made within a reasonable limit of time and it is far from my intention to present herewith unfavorable criticism. My remarks are merely prompted by the ever increasing interest these flies are assuming for medical and veterinary entomology, so that Surcouf's work is likely to be perused as a source of information by many students with little or no entomological training. It seems therefore necessary to call attention to certain omissions and errors which might easily lead astray the non-specialist.

In the introductory part Surcouf deals with the external morphology and adds certain details of internal anatomy: his researches upon the structure of the ocelli and the genitalia are presented as original work. An account of the habits of the adults, oviposition, larval and pupal stages, and enemies follows. This is supplemented by some original observations in an appendix (pp. 186-194) and also by notes under the several genera.

[1]Contribution from the Department of Tropical Medicine of Harvard University Medical School.

Nevertheless the treatment of the bionomics is very inadequate and hardly does justice to our present knowledge. Thus it is stated that "the habits of *Goniops* are unknown" (p. 105), although the life-history of that genus has been worked out by W. R. Walton (Ent. News, XIX, 1908, pp. 464-465, Pl. XXII) and W. L. McAtee (Proc. Ent. Soc. Washington, XIII, 1911, pp. 21-29, Pls. I-III). Incidentally it may be mentioned that Surcouf's supposition that *Goniops* lives as an external parasite "after the fashion of *Hippobosca*" is a mere surmise not backed by any observation and highly improbable. To return to the bionomics of the family, W. Marchand has fortunately published a recent and very full account of "The Early Stages of Tabanidæ" (Monogr. of the Rockefeller Institute, New York, No. 13, 1920, 204 pp., 15 Pls.), in which the student will find all needed information. In his discussion of the parasitary specificity of tabanids (pp. 189-190), Surcouf mentions that, while most of the blood-sucking species attack mammals, *Tabanus crocodilinus* Austen and other African forms bite crocodiles and that he has himself taken a *Tabanus* in the Sahara on *Varanus griseus*. Still more remarkable, however, is the behavior of *Tabanus albipectus* Bigot, which, according to Fryer's observations in the Seychelles (Austen, Bull. Ent. Research, XI, 1920, p. 45), attacks sea-turtles, biting them between the plates of the neck.

It would be fastidious to list the errors of dates and pages which I have noticed in the bibliography, but the student should be warned against trusting the references indiscriminately.

REMARKS UPON THE GENERA

Surcouf is extremely conservative in his taxonomic treatment, since, with few exceptions, he accepts only genera that have been in use for a long time among students of the group. He retains the division into two subfamilies, Tabaninæ and Pangoniinæ, proposed more than fifty years ago by H. Loew (Die Dipteren-Fauna Südafrika's, I, 1860, pp. 14 and 31). *Thaumastocera* Grünberg he places at the end of the family as a genus of doubtful affinities, but, on account of the absence of tibial spurs, it certainly comes in the Tabaninæ, a group which,

moreover, contains several other forms with well-developed ocelli. Surcouf admits 43 genera, of which *Baikalia* (p. 39; monotypic for *B. vaillanti* Surcouf), *Guyona* (p. 141; monotypic for *Pangonia mesembrinoides* Surcouf, 1908),[1] *Brodenia* (p. 160; monotypic for *B. cinèrea* Surcouf), and *Lesneus* (p. 161; monotypic for *L. canescens* Surcouf) are proposed for the first time. Unfortunately two of these new generic names are preoccupied: *Baikalia* Surcouf (not *Baicalia* v. Martens, 1876) I propose to replace by *Surcoufiella*, new name, and *Brodenia* Surcouf (not *Brodenia* Gedoelst, 1913) by *Braunsiomyia*, new name. The only species of the last-named genus, *Braunsiomyia cinerea* (Surcouf) was discovered on the sandy beach at Port Elizabeth (Algoa Bay), Cape Colony, by that enthusiastic South African entomologist Dr. H. Brauns.

Walker's subdivisions of *Pangonius* and most of Ad. Lutz' generic creations among South American tabanids are not accepted by Surcouf and many of those proposed by Ad. Lutz are not even enumerated. There are, however, a number of other generic names published previous to 1920, which have been overlooked by Surcouf and in some other cases the names he uses are obsolete or wrongly spelled.

Hexatoma Meigen, 1820 (p. 26). This name is preoccupied by *Hexatoma* Latreille, 1809, and should be replaced by *Heptatoma* Meigen, 1803, which, moreover, has many years priority.

Chrysozona Meigen, 1800 (p. 28). I cannot agree with those who claim that this name should replace *Hæmatopota* Meigen, 1803. I have recently examined an original copy, now at the Library of the American Museum of Natural History, of Meigen's pamphlet "Nouvelle Classification des Insectes Diptères" (Paris, 1800) and find that this work merely gives short generic descriptions without mentioning any species, so that these so-called genera having no genotypes should be regarded as *nomina nuda*, and therefore without nomenclatorial standing.

Lepidoselaga Osten Sacken, 1876 (p. 43). There is no sufficient reason why this amended form should be preferred to the original *Lepiselaga* Macquart, 1838.

[1] *Guyona* does not appear to be generically distinct from *Orgizomyia*, as will be shown in a subsequent paper.

Dorcalæmus Austen, 1910 (p. 112). This name was originally spelled *Dorcalæmus.*

Cænoprosopon Ricardo, 1915 (p. 132). The original spelling of this name is *Cænoprosopon.*

Diclisa (p. 112) as characterized by Surcouf is not *Diclisa* Schiner, 1867, which has as genotype *Pangonia incompleta* Macquart and is evidently a synonym of *Scione* Walker, 1850. Surcouf's genus *Diclisa* appears to correspond to Enderlein's (1922) *Rhinotriclista* and *Triclista.*

Cadicera Macquart, 1855 (p. 106). As shown by Austen (Bull. Ent. Research, XI, 2, 1920, p. 140), this name should be replaced by the earlier *Phara* Walker, 1850.

Diatomineura Rondani, 1863 (p. 129). Brèthes (Bull. Soc. Ent. France, 1914, p. 59) and Austen (Bull. Ent. Research, XI, 2, 1920, p. 139) have shown that this is a synonym of the earlier *Osca* Walker (Insecta Saundersiana, Dipt., I, 1850, p. 10).

Orgyzomyia Grünberg, 1906 (p. 139). The correct spelling is *Orgizomyia.*

Pelecorrhynchus Macquart, 1850 (p. 110). This name was originally spelled *Pelecorhynchus.*

The following generic names are not listed by Surcouf:

Acanthocerella Brèthes, An. Mus. Nac. Buenos Aires, XX, 1910, p. 475. Monotypic for *A. boliviensis* Brèthes, 1910. South America.

Amphichlorops Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 166. Type: *Tabanus flavus* Wiedemann, 1828. South America.

Anacampta Schiner, Verh. Zool. Bot. Ges. Wien, XVII, 1867, p. 305. Without description or species. Evidently an error for *Apocampta* Schiner.

Catachlorops Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 166. Type: *Dichelacera fuscipennis* Macquart, 1847. South America.

Chelotabanus Ad. Lutz, Mem. Inst. Osw. Cruz, VI,1914, p. 166. Type: *Tabanus fuscus* Wiedemann, 1819. South America.

Chlorotabanus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 167. Type: *Tabanus mexicanus* Linnæus, 1767. North and South America.

Cœnura Bigot, Ann. Soc. Ent. France, (3) V, 1857, p. 286. Monotypic for *C. longicauda* Bigot, 1857. Chile. A number of species have been described, all of which have been omitted by Surcouf.

Cryptotylus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 166. No species mentioned. South America.

Cydistomyia Taylor, Proc. Linn. Soc. New South Wales, XLIV, 1919. p. 47. Monotypic for *C. doddi* Taylor, 1919. Queensland.

Dicladocera Ad. Lutz, Comm. Linhas Telegr. Estr. de Matto Grosso ao Amazonas, Ann. No. 8, Zool., Taban., 1912, p. 4. Monotypic for *Dicladocera unicolor* Ad. Lutz, 1912.

Dyspangonia Ad. Lutz, Revista Soc. Scientif. Sao Paulo, I, 1, 1905, p. 27. Type: *Pangonia fuscipennis* Wiedemann, 1828. This is a synonym of *Esenbeckia* Rondani.

Erephosis Bigot, Mém. Soc. Zool. France, IV, 1891, p. 414. Misspelling of *Erephopsis*.

Esenbackia Surcouf, Bull. Mus. Hist. Nat. Paris, XV, 1909, p. 257. Misspelling of *Esenbeckia*.

Gonisops Kertész, Catal. Tabanid., 1900, p. 25. Evidently a misspelling of *Goniops*.

Holococeria Ricardo, Arch. f. Naturgesch., LXXX, Abt. A, Heft 8, (1914) 1915, p. 128. A misspelling of *Holcoceria*.

Laphriopsis Ad. Lutz, Mem. Inst. Osw. Cruz, III, 1911, p. 71. An evident error for *Laphriomyia*.

Leptotabanus Ad. Lutz and A. Neiva, Mem. Inst. Osw. Cruz, VI, 1914, p. 72. The name is used in an enumeration of species for *Leptotabanus nigrovenosus* Ad. Lutz and A. Neiva, but I was unable to find a description of either genus or species.

Leucotabanus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 167. Type: *Tabanus leucaspis* Wiedemann, 1828. South America.

Macrocormus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 167. Type: *Tabanus sorbillans* Wiedemann, 1828. South America.

Melanotabanus Ad. Lutz and A. Neiva, Mem. Inst. Osw. Cruz, VI, 1914, p. 76. Monotypic for *M. fuliginosus* Ad. Lutz and A. Neiva, 1914. South America.

Metoponaplos Ricardo, Arch. f. Naturgesch., LXXX, Abt. A, Heft 8, (1914) 1915, p. 124. Type by original designation: *Pangonia parva* Walker, 1848. According to Enderlein (Mitt. Zool. Mus. Berlin, X, 2, 1922, p. 342), this is a synonym of *Scarphia* Walker, 1850, a view with which I fully concur.

Merycomyia Hine, Ohio Naturalist, XII, 1912, p. 515. Type by original designation: *Tabanus whitneyi* Johnson, 1904 (Syn.: *Merycomyia geminata* Hine, 1912). North America.

Neochrysops Walton, Proc. Ent. Soc. Washington, XX, 1918, p. 191. Monotypic for *N. globosus* Walton, 1918. North America.

Neotabanus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 167. Type: *Tabanus trilineatus* Latreille, 1814. South America. Ad. Lutz (Ibidem, p. 47) claims that his generic name has priority over *Neotabanus* Ricardo, 1911, but I have been unable to discover on what evidence this statement is based.

Orthostylus Ad. Lutz and A. Neiva, Mem. Inst. Osw. Cruz, VI, 1914, p. 74. Monotypic for *O. ambiguus* Ad. Lutz and A. Neiva, 1914. South America.

Palimmecomyia Taylor, Proc. Linn. Soc. New South Wales, XLII, 1917, p. 518. Monotypic for *P. celænospila* Taylor, 1917. Queensland.

Parasilvius Ferguson, Proc. Roy. Soc. Victoria, N. S., XXXIII, 1921, p. 8. Monotypic for *P. fulvus* Ferguson, 1921. Australia.

Phœomyia Ad. Lutz, Mem. Inst. Osw. Cruz, III, 1911, p. 83. Evidently a misspelling for *Phœoneura*.

Phœotabanus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 168. Type: *Tabanus litigiosus* Walker, 1850. South America.

Phibalomyia Taylor, Proc. Roy. Soc. Victoria, N. S., XXXII, 2, 1920, p. 165. New name for *Elaphromyia* Taylor (Proc. Linn. Soc. New South Wales, XLI, 1917, p. 749), not of Bigot, 1859. Monotypic for *Elaphromyia carteri* Taylor, 1917. Queensland.

Philorites Cockerell, Entomologist, XLI, 1908, p. 264. Monotypic for *P. johannseni* Cockerell, 1908. Fossil in the Eocene of Colorado.

Rhabdotylus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 166. Type: *Tabanus planiventris* Wiedemann, 1828. South America.

Pœcilosoma Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 167. Type: *Tabanus quadripunctatus* Fabricius, 1805. South America.

Rhigioglossa Wiedemann, Aussereurop. Zweifl. Ins., I, 1828, p. 105. Used in the combination "*Rhigioglossa testacea*" as a synonym of *Rhinomyza edentula* Wiedemann, which thus will be its genotype. The name takes precedence over *Erodiorhynchus* Macquart, 1838, based upon the same species.

Rhynomyza Surcouf, Bull. Mus. Hist. Nat. Paris, XV, 1909, p. 260. Misspelling of *Rhinomyza*.

Stenotabanus Ad. Lutz, Mem. Inst. Osw. Cruz, VI, 1914, p. 167. Type: *Tabanus tœniotes* Wiedemann, 1828. South America

Stictotabanus Ad. Lutz and A. Neiva, Mem. Inst. Osw. Cruz, VI, 1914, p. 72. The name is used in an enumeration of species for *Stictotabanus maculipennis* (Macquart). Since this is a described species the generic name has a standing in nomenclature, even though the genus has apparently not been hitherto defined.

In the case of the new generic names proposed by Ad. Lutz in Mem. Inst. Osw. Cruz, VI, 1914, pp. 166-168, the only published descriptions are contained in a key and are not accompanied by references to species. In a previous article by Lutz and Neiva, however, which appeared in the same volume (pp. 69-80), these new names have been used in enumerations of species and I have selected genotypes from among them. *Cryptotylus* alone has apparently not yet been used in connection with a specific name so that it still is a *nomen nudum*. Ad. Lutz also closes his article with the statement (p. 168) that it was published before (in 1913) in the Brazilian journal "Brazil Medico." I have been unable to discover whether his new generic names should therefore be properly dated from 1913, but it would appear that they were not used in connection with specific names previously to 1914. Many of Ad. Lutz' proposed genera have not been noticed in the Zoological Record.

The following additional genera of Tabanidæ are of more recent date:

Heterochrysops Kröber, Zool. Jahrb., Abt. f. Syst., XLIII, 1920, p. 55. For a number of Palaearctic species of *Chrysops*, none of which is designated as type. *Chrysops flavipes* Meigen, 1804, is herewith selected as such.

Neochrysops Szilády, Ann. Hist. Nat. Mus. Hungarici, XIX, 1922, p. 126. Type by original designation: *Neochrysops grandis* Szilády, 1922, Formosa. The name is preoccupied by *Neochrysops* Walton, 1918.[1] The genus, however, appears doubtfully distinct from *Chrysops* and need therefore not be renamed at present.

Silviochrysops Szilády, Ann. Hist. Nat. Mus. Hungarici, XIX, 1922, p. 126. Monotypic for *Silviochrysops flavescens* Szilády, 1922, Formosa.

Surcoufia Kröber, Arch. f. Naturgesch., LXXXVIII, Abt. A, Heft 8, 1922, p. 115. Monotypic for *Surcoufia paradoxa* Kröber, 1922, Northwest Africa.

Finally in a recent paper which will be considered in detail below, Enderlein has proposed a considerable number of new generic names. These it appears unnecessary to list at present, since their exact status is as yet uncertain.

Remarks Upon North American Species.

Among the misspellings of names, I mention only those of *Chrysops nigribimbo* Whitney (not *nigrilimbo*) and *Tabanus superjumentarius* Whitney (not *suberjumentarius*).

Tabanus lugubris Osten Sacken appears to belong properly in the genus *Snowiellus*, from examination of a specimen obtained at Tampa, Florida, by Mr. E. Bell.

Tabanus whitneyi Johnson belongs in the genus *Merycomyia*.

Tabanus mexicanus. The synonymy and distribution given by Surcouf under that name should be revised. As shown by F. Knab (Insecutor Inscitiæ Menstruus, IV, 1916, pp. 95-100), four species have been commonly confused under *mexicanus*:

[1] *Neochrysops* Bethune-Baker, Trans. Ent. Soc. London, (1922) 1923, p. 279, in Lepidoptera, is similarly preoccupied.

(1) *Tabanus mexicanus* Linnæus (Syn.: *T. olivaceus* de Geer and *T. punctatus* Fabricius). Mexico, Central America, Trinidad.

(2) *Tabanus inanis* Fabricius (Syn.: *T. ochroleucus* Meigen, *T. viridiflavus* Walker; and perhaps also *T. sulphureus* Palisot de Beauvois). South and Central America.

(3) *Tabanus flavus* Macquart. Southeastern United States: from New Jersey to Florida, Missouri and Louisiana. This name is unfortunately preoccupied by *Tabanus flavus* Wiedemann and no substitute appears to be available.

(4) *Tabanus luteoflavus* Bellardi (Syn.: *T. mexicanus* var. *limonus* Townsend). Mexico.

The following North American species have been omitted:

Chrysops calopterus Hine, Ohio Naturalist, VI, 1905,p. 392, ♀. Guatemala.

Chrysops hinei Daecke, Ent. News, XVIII, 1907, p. 143, ♀. New Jersey.

Chrysops parvulus Daecke, Ent. News, XVIII, 1907, p. 142, ♀. New Jersey.

Merycomyia geminata Hine, Ohio Naturalist, XII, 1912, p. 515, Pl. XXV, figs. 2 and 4, ♀ ♂. This is a synonym of *Merycomyia whitneyi* (Johnson).

Merycomyia mixta Hine, Ohio Naturalist, XII, 1912, p. 516, Pl. XXV, figs. 1 and 3, ♀. Georgia, North America.

Neochrysops globosus Walton, Proc. Ent. Soc. Washington, XX, 1918, p. 192, fig. I, ♀. Eastern United States (Maryland).

Silvius jonesi Cresson, Proc. Ac. Nat. Sc. Philadelphia, LXXI, 1919, p. 175, ♀ ♂. California.

Tabanus subniger Coquillett, Ent. News, XVII, 1906, p. 48, ♀. Illinois.

Tabanus atratus var. *fulvopilosus* Johnson, Psyche, XXVI, 1919, p. 164, ♀. Florida, New Jersey.

A number of additional species of *Tabanus* have been described by J. McDunnough in 1921 and 1922 (Canad. Entom., LIII, 1921, pp. 139-144 and LIV, 1922, p. 239), namely: *T. atrobasis*, *T. laniferus*, *T. metabolus*, *T. nudus*, *T. rupestris*, and *T. trepidus*; and this author has also reinstated *Tabanus calif-*

ornicus Marten and *T. hæmaphorus* Marten as valid species. More recently Hine (Canad. Entom., LV, 1923, pp. 143-146) has added *T. gracilipalpis* and *T. sexfasciatus*.

Including these, we obtain a total of 334 species of Tabanidæ known at present from America north of Panama. They are divided among the several genera as follows: *Apatolestes*, 1; *Chrysops*, 71; *Hæmatopota*, 3; *Corizoneura*, 4; *Diachlorus*, 1; *Diatomineura*, 4; *Dichelacera*, 6; *Rhinotriclista* (*Diclisa* of Surcouf), 1; *Erephopsis*, 2; *Esenbeckia*, 1; *Goniops*, 1; *Lepiselaga*, 1; *Merycomyia*, 2; *Neochrysops*, 1; "*Pangonius*,"[1] 18; *Pityocera*, 1; *Scione*, 2; *Silvius*, 4; *Snowiellus*, 2; *Stibasoma*, 2; and *Tabanus*, 206. Of these *Goniops*, *Merycomyia*, *Neochrysops*, and *Snowiellus* are restricted to the Nearctic region (north of Mexico).

It may still be mentioned that Surcouf (p. 130) erroneously quotes *Trichophthalma amœna* Bigot and *Hermoneura landbecki* Philippi among the synonyms of *Diatomineura latipalpis* (Macquart), having evidently followed in this Kertész (Cat. Dipt., III, 1908, p. 170). Both Bigot's and Philippi's descriptions refer, however, to a nemestrinid which should be known as *Eurygastromyia landbecki* (Philippi). See Lichtwardt, Deutsch. Ent. Zeitschr., 1910, p. 608.

Remarks Upon Ethiopian Species

Tabanus corax Lœw, Wien. Ent. Monatschr., VII, 1863, p. 10. Surcouf (p. 79) lists this as a doubtful synonym of *Tabanus pluto* Walker. Neave (Bull. Ent. Research, V, 1915, p. 308), however, has shown that Lœw's name should be used for *Tabanus xanthomelas* Austen, of which *T. leucaspis* v. d. Wulp (not of Wiedemann) is a synonym.

Tabanus alboventralis Newstead is recorded twice in the list (p. 59), the first time misspelled "*albiventralis*." It is apparently a synonym of *T. sufis* Jænnicke.

[1]Whether there any true *Pangonius*, in the restricted sense, in North America appears extremely doubtful. The three species which I have examined, viz., *tranquilla* Osten Sacken, *rasa* Osten Sacken, and *fera* Williston present all the characters of Austen's genus *Buplex*, to which, I believe, they should be transferred.

Tabanus blanchardi Surcouf and *T. gabonensis* Macquart are still listed as distinct species, whereas they are now generally regarded as synonyms of *T. secedens* Walker.

Hæmatopota maculosifacies Austen is listed twice (p. 34); also erroneously as *maculifacies* Austen.

Pangonius brevis Austen (p. 127) belongs properly in the genus *Phara* (*Cadicera*).

Pangonius austeni J. Bequaert (p. 127). This name should be deleted from the list. As stated by Austen (Ann. Mag. Nat. Hist., (8) XI, 1913, pp. 560-562), it was based upon the male of *P. infuscus* Austen and the female of *Diatomineura neavei* Austen. I have convinced myself of the correctness of Major Austen's view after he has kindly compared some of my specimens with the types of these two species, during my recent visit at the British Museum.

Pangonius neavei J. Bequaert (p. 128) should also be dropped since it is not Austen's *Diatomineura neavei*, but was based on both sexes of *Corizoneura inornata* Austen, as I have recognized after comparison with the types.

In my paper on Congo tabanids, Rev. Zool. Afr., II, 1913, p. 222, I have also recorded a male *Chrysops fusca* and a female *C. distinctipennis*. As Major Austen has pointed out to me at the British Museum, both specimens belong to *Chrysops stigmaticalis* Lœw. On the other hand, *Diatomineura virgata* Austen, *Dorcalæmus candidolimbatus* Austen, and *D. compactus* Austen of the same paper were correctly identified.

I have noticed the following misspellings of names: *Hæmatopota heptogramma* for *H. heptagramma*; *H. hirsutitarsis* for *H. hirsutitarsus*; *Tabanus nyassæ* for *T. nyasæ*; and *T. wosnami* for *T. woosnami*.

The following Ethiopian species have been omitted:

Hæmatopota furva Austen, Bull. Ent. Research, III, 1912, p. 334, Pl. XI, fig. 7, ♀ ♂. Uganda and Kenya Colony.

Hæmatopota pertinens Austen, Ann. Mag. Hat. Hist., (8) I, 1908, p. 423, ♀. Nyasaland, Rhodesia, Northern Nigeria.

Hæmatopota picta Surcouf, Bull. Muséum Paris, XIV, 1908, p. 155, ♀. Abyssinia.

Hæmatopota schoutedeni (Surcouf) = *Chrysozona schoutedeni* Surcouf, Rev. Zool. Afric., I, 1911, p. 89, ♀. Belgian Congo.

Hinea distincta Ricardo, Arch. f. Naturgesch., LXXX, Abt. A, Heft 8, (1914) 1915, p. 126, ♀. Cameroon.

Diatomineura neavei Austen, Bull. Ent. Research, I, 1911, p. 279, ♀ ♂. Katanga.

Pangonius leucomelas Wiedemann, Aussereurop. Zweifl. Insekt., I, 1828, p. 90, ♀. Cape of Good Hope.

Pangonius oldii Austen, Ann. Mag. Nat. Hist., (8) I, 1908, p. 215, ♀ ♂. Nyasaland.

Tabanus zoulouensis (Bigot)=*Atylotus zoulouensis* Bigot, Mém. Soc. Zool. France, V, 1892, p. 647, ♀. Cape Colony.

Tabanus ugandæ "Ricardo" Surcouf, Bull. Muséum Paris, XIII, 1907, p. 41, has apparently not been described.

Silvius callosus Ricardo, Ann. South African Mus., XVII, 1920, p. 529, ♀ ♂. South Africa.

Silvius hirsutus Ricardo, Ann. South African Mus., XVII, 1920, p. 529, ♀ ♂. South Africa.

Professor J. S. Hine and I have recently completed a check-list of African Tabanidæ. We find that, after various additions and corrections, the total number of species at present described from the Ethiopian region is 422, divided among 23 genera as follows: *Adersia*, 1; *Aegophagamyia*, 1; *Braunsiomyia* (=*Brodenia*), 1; *Buplex*, 8; *Chrysops*, 30; *Dorcalæmus*, 6 (and 1 variety); *Hæmatopota* (including *Austenia*, *Holcoceria*, and *Parhæmatopota*), 118; *Hippocentrum*, 5; *Hinea*, 3; *Lesneus*, 1; *Nuceria* (=*Corizoneura*), 17; *Orgizomyia* (including *Guyona* and *Thriambeutes*), 4; *Osca* (=*Diatomineura*), 2 (and 1 variety); *Pangonius*, 35 (and 1 variety); *Phara* (=*Cadicera*), 15; *Pronopes*, 2; *Rhigioglossa* (=*Erodiorhynchus*), 1; *Rhinomyza*, 9; *Scarphia* (=*Metoponaplos*), 2; *Silvius* (including *Mesomyia*), 12; *Subpangonia*, 2; *Tabanus*, 145 (and 10 varieties); and *Thaumastocera*, 2. The Malagasy region possesses only 28 species, viz., *Aegophagamyia*, 2; *Bouvierella*, 12; *Chrysops*, 4; *Orgizomyia*, 1; *Rhinomyza*, 5; and *Tabanus*, 4. Of these genera *Adersia*, *Aegophagamyia*, *Bouvierella*, *Braunsiomyia*, *Dorcalæmus*,

Hinea, *Lesneus*, *Orgizomyia*, *Phara*, *Pronopes*, *Rhigioglossa*, *Scarphia*, *Subpangonia*, and *Thaumastocera* are precinctive.

* *
*

The Tabanidæ are a very natural and remarkably uniform group of flies, and, whereas there has never been any doubt as to the limits of the family, its further subdivision is much more difficult.

Lœw's arrangement into two subfamilies has been generally adhered to and entomologists have been slow in recognizing the new generic divisions that have been proposed from time to time. This is clearly shown by the unsuccessful attempts at splitting up the extensive genus *Tabanus*, of which about 1150 species are known at present. In 1909, Ad. Lutz (Zool. Jahrb' Suppl., X, p. 624) proposed raising Lœw's subfamilies to the rank of major divisions. The Opisthacanthæ, with tibial spurs at the hind tibiæ, he divided into three subfamilies: Pangoniinæ, Silviinæ, and Chrysopinæ. The Opisthanoplæ, without tibial spurs, also formed three subfamilies: Diachlorinæ, Lepiselaginæ, and Tabaninæ. Among the Tabaninæ he further distinguished the Tabaninæ haploceræ, with toothed third antennal joint, and the Tabaninæ schistoceræ, with branched third antennal joint. Ad. Lutz' subdivisions, however, have not all been very clearly defined and, as they were evidently based on a study of South American insects only, they have not been accepted by other entomologists.

Quite recently Enderlein has come forward with a much more pretentious scheme of classification, intended to be of universal application.[1] He also adopts Lœw's two major subdivisions of the family, for which he uses the names proposed by Ad. Lutz.

In the Opisthacanthæ he recognizes four subfamilies separable as follows:[2]

[1]G. Enderlein. Ein neues Tabanidensystem. Mitt. Zool. Mus. Berlin, X, 2, 1922, pp. 333-351.

[2]Throughout his key Enderlein uses the word "Fühlergeissel" for the third antennal segment and not for the terminal style, but I have corrected this oversight.

1. Antennal style four-jointed, rarely three-jointed (in one case all the joints fused) ..... Silviinæ.
   Antennal style seven-jointed, rarely six-jointed. ..... 2.
2. Anal cell open ..... Pelecorhynchinæ.
   Anal cell closed ..... 3.
3. First posterior cell open, rarely closed just at the margin. ..... Melpiinæ.
   First posterior cell closed some distance before the margin ..... Pangoniinæ.

The Opisthanoplæ he divides into five subfamilies:

1. Antennal style three-jointed, rarely two-jointed ..... Hæmatopotinæ.
   Antennal style four-jointed ..... 2.
2. Anal cell open; no ocelli ..... Chasmiinæ.
   Anal cell closed, petiolate ..... 3.
3. First antennal segment longer than thick; no ocelli ..... Diachlorinæ.
   First antennal segment about as long as thick. ..... 4.
4. First posterior cell closed; ocelli always absent .. Bellardiinæ.
   First posterior cell open; ocelli sometimes present. Tabaninæ.

Enderlein accepts for the whole of the family Tabanidæ 131 genera, that is three times as many as Surcouf.[1] These are divided among his nine subfamilies as follows: Pelecorhynchinæ, 2; Melpiinæ, 17; Pangoniinæ, 22; Silviinæ, 25; Chasmiinæ, 2; Bellardiinæ, 5; Tabaninæ, 40; Diachlorinæ, 8; and Hæmatopotinæ, 10. According to this classification the North and Central American species would represent 27 genera, namely:

Melpiinæ: *Apatolestes*, *Osca* (*Diatomineura*), (and *Goniops*, which was not known to Enderlein).

Pangoniinæ: *Pangonius*, *Rhinotriclista*, *Scione*, *Pityocera*, *Fidena*, *Esenbeckia*, and *Ricardoa*.

Silviinæ; *Chrysops*, *Silvius*, (and *Neochrysops*, which was not known to Enderlein.)

Bellardiinæ: *Bellardia*.

[1]Quite recently (Deutsch. Ent. Zeitschr., 1923, pp. 544-545) Enderlein has briefly defined 21 additional new genera. Of these, *Anacimas* is based upon a North American species.

Tabaninæ: *Stibasoma, Dichelacera, Dasyommia, Selasoma, Snowiellus, Hybomitra, Therioplectes, Tabanus, Atylotus, Lepiselaga*, (and *Merycomyia*, which was not known to Enderlein).

Diachlorinæ: *Diachlorus*.

Hæmatopotinæ; *Hæmatopota*.

A commendable feature of Enderlein's work is the designation of genotypes, though in some cases they are manuscript names of as yet undescribed species. Unfortunately the author has evidently failed to inquire whether types had not been previously selected for some of the older genera. Since this is likely to cause some confusion in the future, I may point out some of the cases I have noticed.

Diachlorus Osten Sacken. The genotype is *Tabanus bicinctus* Fabricius, as designated by Coquillett (1910); not *Tabanus ferrugatus* Fabricius as given by Enderlein.

Dichelacera Macquart. The type of this genus is *Dichelacera unifasciata* Macquart, as designated by Coquillett (1910); Enderlein gives *Tabanus cervicornis* Fabricius.

Corizoneura Rondani. The type of this genus is *Tanyglossa athiopica* Thunberg (Syn.: *Pangonia appendiculata* Macquart), as designated by Coquillett (1910) and again by Austen in 1920 (Bull. Ent. Research, XI, p. 139). Enderlein's genus *Corizoneura*, with *Pangonia angustata* Macquart as type, is entirely different and its characters seem to agree with those of *Buplex* Austen (Type: *Pangonia suavis* Lœw), a genus evidently overlooked by Enderlein.

Erephopsis Rondani. The genotype is *Pangonia fulvithorax* Wiedemann, as designated by Coquillett (1910). Enderlein gives *Tabanus guttatus* Donovan.

Lilæa Walker. *Pangonia lurida* Walker was designated as type by Coquillett (1910). Enderlein gives as such *Pangonia rœi* King.

Melpia Walker. *Pangonia fulvithorax* Wiedemann, is the genotype designated by Coquillett in 1910, which makes this generic name a strict synonym of *Erephopsis* Rondani. *Melpia* Enderlein, with *Melpia exeuns* Walker as type, if really generically distinct from *Erephopsis*, will need a new name.

Nemorius Rondani. Monotypic for *Chrysops vitripennis* Meigen, as originally proposed by Rondani. Enderlein gives *N. singularis* Meigen as type.

Nuceria Walker. *Pangonia longirostris* Hardwicke was designated as type by Coquillett in 1910. Enderlein gives as such *Tabanus rostratus* Linnæus.

Ommatiosteres Enderlein. Enderlein gives as type of this new genus *Pangonia bifasciata* Wiedemann, and places it in the Melpiinæ, which, according to his key, have the first posterior cell open. *P. bifasciata*, however, has been thus far placed among the *Pangonius* with the first posterior cell closed.

Pangonius Latreille. Latreille (1810) and Coquillett (1910) designated *Tabanus proboscideus* Fabricius, 1794 (= *Pangonia maculata* Fabricius, 1805) as the type. Enderlein gives as such *Tabanus marginatus* Fabricius, which was not among the species mentioned by Latreille when he originally proposed the genus.

Philoliche Wiedemann. Coquillett designated *Tabanus rostratus* Linnæus as type in 1910, so that *Nuceria* Enderlein (not of Walker) is an exact synonym of *Philoliche*. Enderlein's *Philoliche*, however, with *Tabanus angulatus* Fabricius as type, is entirely different.

Siridorhina Enderlein. This is an exact synonym of *Nuceria* Walker (not of Enderlein), since both have the same genotype: *Pangonia longirostris* Hardwicke. To judge from the characters given in Enderlein's key, both *Siridorhina* Enderlein and *Nuceria* Walker appear to equal *Corizoneura* Rondani and indeed Austen includes *Pangonia longirostris* Hardwicke in *Corizoneura* as defined by him in Bull. Ent. Research, XI, 1920, p. 139. The genus should be known as *Nuceria* Walker, since that name has several years priority.

In his introduction Enderlein mentions several genera whose descriptions were not accessible to him. There are, unfortunately, a number of others which have also been overlooked, for instance such a well-known type as *Goniops* Aldrich.

Enderlein's paper was issued as a preliminary account, pending the publication of a more comprehensive revision of the tabanid genera. Meanwhile it is difficult to judge of the validity

or usefulness of the many subfamilies, tribes, and genera which he adopts, the more so since several of his new genera are based upon undescribed species. The real test as to whether these groups are natural divisions or merely based upon artificial combinations of characters will come when Enderlein attempts to classify all or at least the majority of the described species. Unless this test is satisfactorily met, it is difficult to see how Enderlein's work will not merely add to the intricacy of an already overburdened taxonomy.

NOTES ON SOME NEW ENGLAND PHORIDÆ (DIPTERA)[1]

By Charles T. Brues.

Among a small series of Phoridæ recently received for identification from Mr. C. W. Johnson there are two species of particular interest. One is a new species of Apocephalus, a genus known to develop as a parasite of ants, and the other a small wingless female of Puliciphora which appears during the winter months.

Apocephalus borealis sp. nov. (Fig. 1, a, b, c,)

♀. Length, including ovipositor 2.2 mm. Pale yellow, the central portion of the abdomen with an orange tinge and the legs pale brownish yellow; first segment of abdomen brownish, with pale hind margin; second segment with a brownish blotch at the middle of the lateral margin; third and fourth each with a

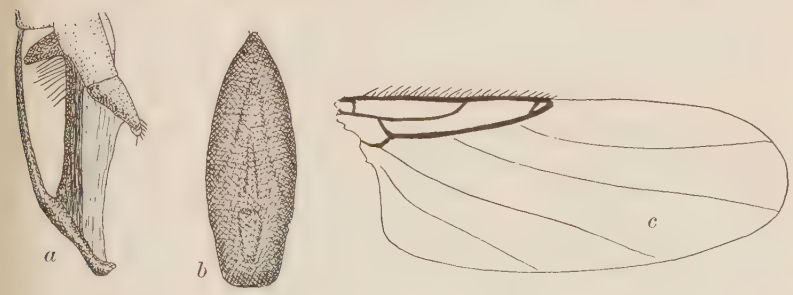

Fig 1. *Apocephalus borealis* sp. nov. a, apex of abdomen with ovipositor in lateral view; b, ovipositor in ventral view; c, wing.

larger darker spot; fifth entirely fuscous; sixth with the anterior angles brown; ovipositor brownish black, paler at tip, the membrane covering its upper side pale. Wings hyaline, venation pale fuscous. Front barely as high as wide; with only eight bristles below the ocelli; lowest row consisting of two reclinate

[1]Contribution from the Entomological Laboratory of the Bussey Institution Harvard University, No. 234.

post antennal ones and a lateral one next to the eye, median pair of the row above further apart than the post-antennals, this row curved upwards at the sides with the lateral bristle rather close to the eye margin and nearer to one of the median bristles than these are to one another. Ocellar row of four. All bristles strong, subequal. Median frontal suture distinct; lower half of front with scattered minute black bristles. Post-ocular cilia moderate, but the upper one on each side much enlarged. Antennæ pyriform, obtusely pointed, as long as the front; arista no longer than the third joint, very stout, especially at base, nearly bare. Palpi rather broad, weakly bristled; cheeks each with two downwardly directed macrochætæ. Mesonotum sub-shining, with one pair of dorsocentral macrochætæ; scutellum with one pair of bristles, the lateral pair very minute, scarcely visible. Propleura with two slender bristles above the insertion of the coxa and two minute ones near the humeral angle; mesopleura bare. Front coxa with a noticeable stripe of minute bristles along the anterior edge; middle tibiæ not distinctly setulose; hind tibiæ with a line of very delicate, closely placed setulæ inside the posterior edge; all tarsi slender. Abdomen broad; second segment elongated, twice as broad as long, bare laterally; third to fifth segments gradually shorter, longer at the sides than along the median line; sixth longer and narrower, almost semicircular, with a few small marginal bristles medially at apex. Ovipositor of peculiar form; in dorsal view projecting beyond the sixth segment for a distance half the length of the abdomen; consisting of two chitinous pieces united at their apices, the upper one straight, issuing from the underside of the fifth and sixth segments and bearing below near the base a number of strong bristles; lower piece curved upward to meet the upper one and connected to it at the base by a large chitinous tooth originating at the extreme base of the upper piece. Viewed from the side (Fig. 1, A) the upper piece is seen to be nearly circular in section and the lower one greatly flattened; in ventral view (Fig. 1, B) the lower piece is spatulate, with truncate tip. Wing (Fig. 1, C) unusually narrow, costa not quite attaining the middle of the wing; first section of costa twice the length of the second; third very short, the minute second vein nearly per-

pendicular to the costa; fourth vein very slightly and evenly curved; fifth faintly bisinuate; sixth and seventh similarly sinuate; costal cilia rather long and set moderately close together.

Type from Salisbury Cove, Maine, July 17, 1913 (C. W. Johnson). It is deposited in the collection of the Boston Society of Natural History.

The distinguishing characteristics of this species may be indicated by the following tabular arrangement.

Key to the North American Species of Apocephalus (Females).

1. Front more than twice as wide as long, ovipositor narrowed to tip, without lateral enlargements....*wheeleri* Brues.
   Front quadrate or nearly so.....2.
2. Costal vein much less than half the length of the broad wing, with long, sparse fringe; ovipositor broad, with acuminate apex.....*spinicosta* Malloch.
   Costal vein about half the length of the wing, which is not unusually broad; costal fringe shorter and more dense 3.
3. Ovipositor, in dorsal view, swollen near base and apex, with a constriction between ..... *coquilletti* Malloch.
   Ovipositor without lateral expansions, or with one at base only.....4.
4. Scutellum with two marginal bristles, ovipositor with widely separated dorsal and ventral valves; wing very narrow; front entirely yellow.....*borealis* sp. nov..
   Scutellum with the second pair of bristles present, though smaller; ovipositor without separated valves, wing broader.....5.
5. Ovipositor with very strong lateral expansions near base where it is three times as wide as at tip..*pergandei* Coquillet
   Ovipositor with weak expansions at base which is twice as wide as the tip.....*similis* Malloch.

Two other North American species are known only in the male sex. *A. aridus* Malloch differs in having black halteres and a much more sparse costal fringe. *A. pictus* Malloch differs in having four subequal scutellar bristles and a black front.

Puliciphora glacialis Malloch

Proc. U. S. Nat. Mus., Washington, vol. 43, p. 507, figs. (1912).

Concerning the habits of this species there is appended to the original description of the minute wingless female, the remarkable note: " 'Active on the ice', Jan., 1874, Tyngsboro, Massachusetts (F. Blanchard)". As the genus Puliciphora and its relatives are typically tropical insects which extend only sparingly into temperate regions, I have been expectantly waiting for further information relating to this species. In the lot of Phoridæ containing the Apocephalus described above there is a single additional female specimen of *Puliciphora glacialis* found by Mr. C. A. Frost at Framingham, Mass. on March 23, 1907 while sifting for beetles. Reference to the Monthly Weather Review for March 1907, shows that there was an unprecedented warm period in the eastern states from March 21st to 23rd and that a maximum temperature of 76° was recorded at Framingham. Such temporary warm spells during the winter are, of course, the occasion for the appearance of most "winter" or "snow" insects, such as Boreus, Chionea, etc. So far as Chionea is concerned, its closest relatives seem to be inhabitants of cold climates (Pterochionea Alexander, of the nearctic region), and the same appears to hold true for most typical snow-insects.

The present species of Puliciphora is more darkly colored and the abdominal plates are much more heavily chitinized than is usual in the genus. Structurally, however, it seems to be quite typical, even to the presence of the slit-like gland opening on the fifth abdominal segment.

This habit is not unprecedented in the family for there are quite a number of species known, especially among those that frequent carrion which are often taken during the colder spring and fall months. Thus, Trupheoneura and Parastenophora include a number of autumnal forms some of which probably hibernate as adults.

A NEW SPECIES OF DIXA FROM CALIFORNIA.

By O. A. Johannsen.

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The species described below was reared on May first, 1923, by Miss Alice M. Westfall from larvæ collected from the surface of a pool formed by the water from a leak in an irrigation pipe across the street eastward from the Claremont (Cal) high school. In the key published in Psyche (30: 52, 1923) the species will find a place in the couplet with *D. clavula* Will., but differs in having the point of intersection of the radio-median crossvein with the petiole of the radial sector less than one-fourth the length of the crossvein proximad of the base of R4+5 while in *clavula* the intersection lies almost the length of the crossvein proximad of this point. Moreover the basal segment of the clasper in the last mentioned species is distinctly globose.

Dixa aliciae sp. nov.

Male. Head, antennæ, proboscis and palpi brown, proboscis more yellowish below. Thorax including scutellum, yellow; mesonotum with three dull dark brown lines, the middle one divided by a hair line, the laterals abbreviated anteriorly; metanotum and sternopleura brown. Abdomen yellowish brown; basal segment of clasper not globose, its mesal process nearly as long as the terminal segment, straight, slender, parallel sided, the apical fourth still more slender and curved like a plow handle; terminal segment slightly clavate resembling that of *D. modesta* but with longer hairs, especially apically. Legs brownish yellow, extreme tips of femora and of tibiæ darkened, tips of hind tibiæ slightly swollen. Fore basitarsus broken in the only male specimen. Wings hyaline, veins brownish except the base of the radius which is more yellowish; a very faint suggestion of a cloud covers the radio-median crossvein while the petiole of the cubitus is margined posteriorly by a faint grayish line; the subcosta ends slightly distad of the base of the radial sector; petiole

of R2+3, measured on a straight line from its base to the base of the fork, slightly more than half as long as R3; petiole of the media measured from the crossvein about an eighth its length longer than its anterior branch; the position of the radio-median crossvein as described above and nearly in line with the medio-cubital crossvein. Halteres yellow, the upper surface of the knob darkened. Length 2.75 mm. One specimen.

Female. Like the male in coloring. The petioles of both radial and medial forks relatively slightly shorter. Fore basitarsus 0.7 as long as the corresponding tibia. One specimen.

Slide mount of holotype and allotype in the Cornell University collection.

THE NAME OF THE LAC INSECTS

By T. D. A. Cockerell.

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The Monograph of the Tachardiinæ, by Mr. J. C. Chamberlin, recently published in Bulletin of Entomological Research, vol. XIV, is certainly a fine example of modern work on Coccidæ. It appears to exhaust the subject so far as the available materials permit, but of course many species remain to be discovered, and there is much to be done on the biology of all. Before it was published, I called the attention of Professor Ferris to the name *Laccifer* Oken, but he presumably had no access to Oken's work. I am indebted to Mr. C. D. Sherborn for a copy of Oken's account, in Lehrb. Naturg., III (1), 1815, p. 430. He proposes a genus *Laccifer*, for "*Chermes* or *Coccus lacca*." It is stated to be the source of the gum-lac, and to occur by the Ganges on *Mimosa cinerea* and *M. glauca*, plants now known as *Dichrostachys cinerea* (L.) Wight & Arn. and *Leucæna glauca* (L.) Benth. The old error of taking the male coccid for the adult female and some hymenopterous parasite for the adult female is repeated, but does not invalidate the name. I agree with Ferris that these peculiar insects deserve to rank as a family, and accordingly the following changes appear to be necessary:

Family Lacciferidæ (Tachardiidæ Ferris)
Subfamily Lacciferinæ (Tachardiinæ Ckll., pars.)
Laccifer albizziæ (Green, as *Tachardia*)
Laccifer meridionalis (Chamb., as *Tachardia*)
Laccifer greeni (Chamb., as *Tachardia*)
Laccifer fici (Green, as *Tachardia*)
Laccifer ebrachiatus (Chamb., as *Tachardia*)
Laccifer lacca (Kerr, as *Coccus*)
Laccifer conchiferatus (Green, as *Tachardia*)

It may be noted that according to the rules *Tachardina lobata* is to be credited to Green, as he not only published a full description, but gave the name and mentioned a difference from the

Philippine *T. minuta*. Also the combination *Tachardina albida* should not be credited to me, but to MacGillivray; I used the name *Tachardina* only in a subgeneric sense. Mr. Chamberlin indicates subgenera and then immediately uses the names in a generic sense, which is illogical; but it may be anticipated that the latter treatment will eventually prevail.

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